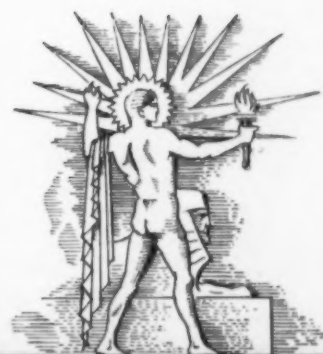


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# SCIENCE NEWS LETTER

THE WEEKLY SUMMARY OF CURRENT SCIENCE •



AUGUST 31, 1935

**Armor, Wherein He Trusteth**

See Page 142

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SCIENCE SERVICE PUBLICATION

## SCIENCE NEWS LETTER

VOL. XXVIII



No. 751

The Weekly Summary of

## Current Science

Published Every Saturday by

## SCIENCE SERVICE

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## DO YOU KNOW?

Sea-lions in the zoo catch colds and sometimes have pharyngitis.

Reeds were commonly used for pens in ancient times and as late as the Middle Ages.

Hemlock bark, waste material of the pulp industry, is found to be rich in tannin.

England is using a squad of police-women in automobiles to enforce speed laws.

On Oeland Island, east coast of Sweden, a new source of helium has been found.

In the South Sea islands, frigate birds are trained to carry messages like homing pigeons.

The Italian Air Ministry has found that olive oil is effective as an ingredient of lubricating oils.

It has been said that every invention of fundamental importance in modern iron and steel industry is of British origin.

In the recent locust invasion of South Africa, railroads placed steam jets before locomotive wheels to blow the slippery insects off the tracks.

Egypt is having an investigation of illicit sales of its antiquities.

A dictionary of color published in 1930 shows 7,056 samples of colors.

Stainless steel is finding a new use in musical instruments such as guitars.

Sixty per cent. of air transport flying in the United States is done at night.

Maps made by the ancient astronomer Ptolemy were used for over a thousand years.

The useful life of a modern airplane is often five to ten years, the U. S. Bureau of Air Commerce finds.

If the descendants of one housefly all flourished, the family would number 1,096,181,249,320,720,000,000,000,000 by the end of the season.

Tests by Government scientists have shown dairymen which kinds of feed affect flavor of milk if eaten by cows before milking time.

Never put pieces of dry ice in glasses of drinking water or beverages, warns a health official, for a piece may be accidentally swallowed and cause a painful burn.

## WITH THE SCIENCES THIS WEEK

Most articles are based on communications to Science Service or papers before meetings, but where published sources are used they are referred to in the article.

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## BIOCHEMISTRY

# Growth Stimulator Isolated; Found Similar to Vitamins

## Twenty Milligrams of Pantothenic Acid Extracted From Several Hundred Pounds of Liver, Chemists Told

WITH a hint that it may have a future practical bearing on the cancer problem, chemists gathering for the semi-annual assay of progress conducted by the American Chemical Society were greeted with the announcement that pantothenic acid, believed to be a universal essential in growth and respiration of the cells of living bodies, has been isolated.

This important contribution to an understanding of the chemical nature of life processes has been made by Prof. Roger J. Williams of Oregon State College, who first reported the existence of pantothenic acid two years ago.

Although the amount of pure acid obtained by Prof. Williams was scarcely equivalent in weight to half a drop of water, about twenty milligrams, it proved sufficient for a dozen or more analyses of its chemical composition.

Pantothenic acid, Prof. Williams found, is composed of just four elements, carbon, hydrogen, oxygen and nitrogen, united in such way that the resulting product is somewhat similar to the vitamins and to the amino acids which are fundamental building blocks in protein.

The molecular structure of the acid has not yet been completely worked out. One of the handicaps to structural studies is the difficulty of obtaining enough of the substance in pure form. Several hundred pounds of liver were required to yield the first twenty milligrams.

In making his report, Prof. Williams said:

"The peculiar quality which makes pantothenic acid interesting is its ability to act as a growth regulator. Tiny amounts have a remarkably stimulating effect on the growth of various types of plants and single-celled animals.

"The problem of how growth is controlled in living organisms has long been a fascinating one. From a practical standpoint the fundamental facts concerning upsets in this growth control, such as occur in tumors, are essential to the solution of the cancer problem."

### Chicken Food Factor Confirmed

As an unexpected preliminary to the national symposium on vitamins, two research men of the University of California announced that they have confirmed the findings of Dr. H. Dam of Copenhagen, Denmark, relative to the existence of a new essential food factor for chickens, which Dr. Dam calls vitamin K.

The American researchers, H. J. Almquist and E. L. R. Stokstad of the department of poultry husbandry at the University, state that without knowing of Dr. Dam's work they arrived at results equivalent to his independently. They are not, however, ready to pronounce the mysterious food factor a separate entity meriting placement on the list of recognized vitamins.

Absence of the supposedly new factor in the diet of chickens receiving adequate amounts of all known vitamins leads to a nutritional disease characterized by internal hemorrhage, hemophilia and anemia, and usually terminated by death. Affected baby chicks bleed to death following extraction of a few pinfeathers.

The disease can be cured, it has been found, by adding fresh or dried green food to the diet which already contains all known essential food factors. Alfalfa is especially potent, and concentrations of the new factor can be obtained by ether extraction and heating with an alkaline substance.

Curiously, rice bran and fish meal, which ordinarily do not prevent the disease, will develop traces of the factor if allowed to stand for some time in a wet condition.

*Science News Letter, August 31, 1935*

## MEDICINE

## Copper as Important In Food as Iron

DEFICIENCY of copper in the body may play as important a part in certain forms of anemia as does a deficiency of iron, Prof. C. A. Elvehjem of the University of Wisconsin has reported.

"Though mothers include iron in the baby's diet, generally in the form of spinach or other green vegetables," Prof. Elvehjem said, "a large percentage of so-called well-fed infants when examined by physicians display the symptoms of a noticeable anemia."

In explanation of this he reported that experiments during the past three years on anemic rats indicate that the administration of iron does not stimulate the maximum production of red blood cells unless traces of copper are added to the treatment. He also warned that the administration of over-large amounts of iron to children may cause them to develop rickets.

In further support of the fact that various metallic elements are extremely essential to life processes, Dr. David M. Greenberg of the University of California reported that although magnesium is needed by the body in such small quantities that most ordinary diets supply enough of it, there are situations in which magnesium deficiency might occur.

As examples he cited the case of babies subsisting on human milk alone; and mothers during pregnancy. Human milk is deficient in magnesium, and during pregnancy mothers apparently require a greatly increased amount of this element for the mineralization of the infant's bones.

*Science News Letter, August 31, 1935*



### WEED TOPS DRINK DEATH

Camel thorn and other tough intractable weeds are being attacked through their tops rather than their roots, in California. Their tops are stuffed into quart jars, which are then filled with a one per cent. solution of sodium arsenite or some other herbicide. Thousands of obstinate bushes have been eliminated by this method, which was devised by Walter S. Ball of the California State Department of Agriculture.



## CHEMISTRY

# Serious Petroleum Shortage Predicted in Near Future

**G**ASOLINE prices are going up in a few years. And when they go up they will stay up.

When that happens, it will be only the symptom of a very serious underlying situation, which will carry with it real danger to the United States, from both the economic and the military sides. The American Chemical Society made public a warning to this effect on the eve of its national meeting at San Francisco.

Difficult industrial adjustments involving investments totaling billions, a radical shift in auto styles toward light, cheap cars, and new and onerous duties for the Navy in protecting trade routes to the foreign oil fields on which we shall have to depend when our own petroleum supply runs low, are among the unpleasant realities we shall have to face less than half a generation hence, the warning stated.

On the naval side, the report said:

"Increasing petroleum imports will result in greater dependence upon our navy and air force to prevent the serious dislocation of industry which would result if such imports were to be interrupted. The manufacture of substitutes, such as shale oil or oil made by the hydrogenation of coal, could not possibly be developed quickly enough to be of importance in a national emergency such as war, which would be settled one way or another long before any large part of our gasoline demand could be supplied from the auxiliary sources.

"The amount of our reserves is fairly accurately known and is believed to be ten to twelve billions of barrels," the report continued. "Although this would be equivalent to about twelve or fourteen years' supply, producing fields rapidly decline but continue to produce small amounts of oil by pumping for many years. Shortage will accordingly be experienced many years before exhaustion.

"The magnitude of the oil reserves in foreign fields is not known as accurately as is our own, but much of our petroleum requirement will, within a few years, come from South America and possibly Russia and Persia."

The authors of the report, Dr. Benjamin T. Brooks, consulting chemical engineer, and L. C. Snider, geologist of Henry L. Doherty and Company, do not place much reliance on the proposed use

of power alcohol to eke out the gasoline supply. They declared:

"Alcohol as a motor fuel is a question of politics and farm subsidies, not an economic question. The Federal Oil Conservation Board has clearly shown that alcohol is not an economic substitute for gasoline except at price levels for gasoline about five times the refinery cost of gasoline during the last five years. Advocates of alcohol and Diesel motor fuel seldom take into account the distribution and filling station cost and taxes on gasoline."

The era of scarcity and higher prices in petroleum products will come long before the total exhaustion of continental American oil fields, in the opinion of Dr. Brooks and Mr. Snider.

*Science News Letter, August 31, 1935*

## CHEMISTRY

# Fears of Petroleum Shortage Held Greatly Exaggerated

**F**EARS of an imminent gasoline shortage in the United States, with skyrocketing prices, are held exaggerated by Government economists, statisticians and petroleum specialists.

Commenting in response to Science Service inquiries, they said they could not agree with Dr. Benjamin T. Brooks, chemical engineer, and L. C. Snider, geologist, both of New York, who predicted before the American Chemical Society meeting in San Francisco that a serious petroleum shortage will arise some time between 1940 and 1943.

The prevailing opinion among persons conversant with the petroleum industry is that while America will undoubtedly be faced with a shortage of natural petroleum at some time, it will be a great deal further in the future than five years.

According to figures of the U. S. Geological Survey, the known petroleum reserves of the United States, excluding unproven areas and unknown potentials, are about 13 1/4 billion barrels. Since the normal rate of consumption is roughly one billion barrels a year, this supply would last at least 13 years, if no new fields were discovered.

## CHEMISTRY

# Butane, Propane Useful When Made Into Liquids

**B**UTANE, propane and other petroleum-gas names now unfamiliar may soon become parts of common speech and consciousness. They are now rather neglected by-products of petroleum refining, but when turned into liquids they can be put to a considerable range of uses, W. Z. Friend and T. W. Legatski of the Phillips Petroleum Company told colleagues at the meeting of the American Chemical Society.

These gases are so versatile, they said, that a single supply may first be used as a solvent, then as a refrigerant, and finally consumed as a fuel either for heating or in internal combustion engines.

They pointed out that the consumption of liquefied gases increased 71 per cent. during the year 1932-33, and 73 per cent. in the year 1933-34, and prophesied that under the stimulation of further applications their use will be increasingly common in the future.

*Science News Letter, August 31, 1935*

New oil fields are now being discovered, giving an addition of approximately 600,000,000 barrels each year. This, to be sure, is not enough to supply our demand without tapping our reserves, but it is enough to make our reserves last a great deal longer than 13 years.

Consumption may rise, of course. The Petroleum Administrative Board's estimates for the month of July and August reveal that it will probably reach an all-time peak for the history of the United States, with about 42,000,000 barrels consumed each month. Consumption is usually higher in the summer months, however, and there will be a dropping off with the approach of winter.

As for a rise in prices due to shortage of petroleum, and its predicted effect of less consumption of gasoline, and small, low-powered automobiles, government statisticians have not been able to discover any link between gasoline consumption and price, or between petroleum supply and price.

Prices in the gasoline field are strictly competitive prices, and not based directly on supply, demand or anything else. Furthermore, there appears to be no re-

lation between price, including state and federal taxes, and petroleum consumption per car, which is roughly 18½ barrels per car each year. For example, in Alabama, the taxes on gasoline are in the neighborhood of nine cents a gallon, and yet there has been no drop in gasoline consumption in that state.

What about synthetic gasoline?

Undoubtedly, at some time in the future the motor cars of the United States will be driven by motor fuel that is at least partly the result of chemical skill.

"Sooner or later a substitute for natural petroleum as the principal source of motor fuel must be found, but what it is, or when it will be commercially practical we don't know," said a member of the Petroleum Administrative Board who refused to be quoted personally.

Shale oil has been mentioned as a possible substitute for petroleum. The prevailing opinion is, however, that while oil distilled from shale is a great potential source of motor fuel, there is no technical process at present capable of recovering it in sufficient amounts and at a cheap enough cost to be practical.

Step number one in providing a substitute for petroleum will be the large-scale synthetic production of gasoline by hydrogenation of coal, it is believed in government circles. A number of successful processes for coal hydrogenation have been developed, notably the Bergius process at present being used on a large scale in Germany, and are now being experimented with in America.

*Science News Letter, August 31, 1935*

In one week in July the New York State Department of Health distributed enough typhoid vaccine to give a first injection to 38,000 persons in the flooded areas of the state.

#### MEDICINE

## Cancer Treatment Advance Awaits Better Lead Compounds

### Patients in Hopeless Stage of Disease Apparently Cured By Heroic Treatment With Colloidal Lead Phosphate

CANCER, one of the most dreaded of mankind's foes, will have to take a major defeat if research chemists can develop new types of lead compounds that will be less toxic to normal body tissue and more certain to concentrate in rapidly growing cells.

This is the opinion of Drs. A. E. Osterberg, J. A. Borgen, and B. T. Horton of the Mayo Clinic, Rochester, Minn.

Dr. Osterberg pointed out that encouraging results in the treatment of cancer have already been obtained through the use of one lead compound already available, namely colloidal lead phosphate.

In a series of eighty-five cases of cancer in the hopeless stage, treatment with colloidal lead phosphate produced apparent cures in at least seven cases. Seven additional cures occurred in the group, but these patients had received other treatment in addition to lead therapy and the cause of recovery could not be definitely assigned.

In explanation of the failures which have been met by other experimenters with lead therapy, Dr. Osterberg stated that enough lead must be administered to cause obvious poisoning. If this is not done, the concentration of lead in the cancerous cells, despite their tendency

to collect it, is not sufficient to cause their necrosis or deterioration.

The patients are later cured of the lead poisoning by the administration of calcium, which facilitates deposition of the lead in the bony structures of the body.

Dr. Osterberg believes lead therapy holds out definite promise in cancer treatment, but is certain that more nearly ideal lead compounds are yet to be found.

Favorable results have been obtained on all types of cancer.

*Science News Letter, August 31, 1935*

#### BIOCHEMISTRY

## Synthetic Cortin to Pave Way for Disease Conquest

IMPORTANT information concerning the chemistry of substances closely related to cortin, the secretion of the outer layer of the adrenal glands, was reported by three representatives of the Mayo Foundation, Drs. E. C. Kendall, H. L. Mason, and C. S. Myers, to the American Chemical Society.

They expressed the hope that the knowledge they have gained from these related compounds, one akin to a complex glucose, another akin to glycerine and the third a crystalline alcohol, will aid in determining the chemistry of cortin itself and bring closer the day when this valuable hormone will become available at reasonable cost for medical therapy.

It was pointed out that adequate supplies of cortin provide one of the most hopeful means of alleviating the fatal Addison's disease. Also, glaucoma, a common cause of blindness in the aged, can be successfully treated by injections of the glandular substance containing cortin. Even that type of near-sightedness known as progressive myopia, long considered incurable, is helped by the administration of the hormone. The scientists said:

"Vast possibilities for the eventual cure of many of man's illnesses will be opened up when cortin can be successfully manufactured by the commercial chemical industry."

*Science News Letter, August 31, 1935*



**NEW PLANE IS QUEER-LOOKING, BUT SAFE**

The bureau of aeronautics, U. S. Department of Commerce, continues its search for a low-priced, safe airplane suitable for everybody's use. The newest specimen, with no tail, rudders on the wing-ends, and a "pusher" propeller, is a very queer-looking craft, but is said to be a good flier and extraordinarily stable and safe.

ARCHAEOLOGY

# "Very Truly Yours" — 2000 B. C.

## Generations of Letter-Writers Have Written About The Same Old Things in the Same Old Way

**L**ETTER writing hasn't changed much in 4,000 years.

Of course, lovelorn ladies in Babylonia had their sentiments written on bricks. There was no letter paper. In a quarrel, a missive could be turned into a missile quicker than you could say "Mesopotamia."

Of course, Babylonia's Cupids were messengers, not government postmen laden with assorted mail for hundreds of people on a route.

Of course, a stack of letter-bricks made no dainty ribbon-tied packet. In fact, a man who gallantly returned a maid's correspondence would likely need to hire an ox-cart. And never, never in those days did a thoughtful lover conceal a message in a bouquet and toss it lightly through his lady's window.

### Beseeking Notes to Kubutum

But outer differences aside, the letter writing game has not shown much novelty since women with names like Tarish-matum sent beseeking notes to men named, for example, Kubutum.

Only chain letters are missing. The ancients seem never to have thought of those.

Women were writing to men for money, for instance, as long ago as 2000 B.C. And very well-worded letters they composed, too. A modern "gold digger" would find it hard to improve on some of the early clay-brick models.

This is strikingly revealed by the latest scholarly progress in translating clay tablets unearthed in Babylonia. Before the Semitic and Biblical Club at Yale University recently, Dr. John B. Alexander told of deciphering 61 letters chosen from Yale University's rare and valuable Babylonian Collection.

Admitting that there is a thrill in reading something that perhaps no other person has read since the original writer filed it away for reference some 4,000 years ago, Dr. Alexander sometimes lost the thrill as he translated letter after letter sent by Babylonia's business men. A large number of the clay tablets he had chosen turned out to be these routine letters. Many were almost as modern and as dull, in their form letter style, as the contents of any steel filing case in a New York skyscraper. They contained some

flashes of valuable information, shedding light on an old land famed for its big business, but not much more in scholarly returns.

But as Dr. Alexander worked his way through the ancient correspondence, he came upon a surprising discovery.

"By a sort of natural selection," he explained, "those tablets which proved more difficult remained undeciphered, while I translated those which were easier to understand. And it finally turned out that the last and most difficult letters of all were those of women!"

He added with a smile: "Perhaps this is hardly an original discovery."

The next discovery was more encouraging. If the women's letters were harder to read, they were also more interesting.

Recounting some of these feminine letters, Dr. Alexander revealed the money troubles of a woman named Tarish-matum who has been dead so long that no embarrassment can be caused her by making her letter public.

Tarish-matum was not literally a gold digger. She was merely after silver, and fairly small change at that. The shekel she begged for was an amount of lump silver weighing a fraction of an ounce. Coins were not invented in her day.

### Written Ten Times: No Answer

As summed up by Dr. Alexander: "Tarish-matum writes to Kubutum begging him to send her a shekel of silver. She has written ten times and he hasn't answered her. She hasn't a single measure of meal. In the name of Pa-bil-sag (one of the gods), would he send her one shekel."

Reading between the lines in this pathetic message, Dr. Alexander finds that the hard-hearted Kubutum was illiterate, and a third person would have to read his mail to him. For the unhappy Tarish-matum added a sort of postscript not intended for Kubutum's eyes. In this note, she addressed a third person, urging him in honeyed words to use his influence to induce Kubutum to send her the shekel of silver.

Another letter read after four thousand years by Dr. Alexander, shows gold digging on a more ambitious scale, and handled in flowery language, even as the matter might be handled today.

This fair Babylonian was the helpless heroine of a save-the-old-homestead situation. Quoting poetry, she addressed the man she was appealing to as her sun, and the cedar in whose shadow she found shelter. With this clinging-vine approach, she came to the point. She must sell the home of her fathers. But, ah, well, if only there is enough to bury her that is all she will ask.

"We may well suppose," commented Dr. Alexander optimistically, "that the man addressed made the hoped for response, and the old home did not have to be sold after all."

How long ago letter writing began, and how modern the earliest letters sound, has only been discovered as archaeologists dig into the ruins and trash piles of Babylonia and Egypt. Before writing was invented, people sent messages entrusted to the memory of a runner. With the evolution of writing, the ancient civilizations were quick to apply it to their long-distance communication. But until recent years, the world had lost track of how very old the invention of writing really is.

### Early Letters Were Dead Letters

For several thousand years, the world's early letters have remained dead letters, more completely lost than any postal system could misplace a communication. These old letters were already dead and buried when the Greeks came along, for one Greek historian showed ignorance by saying that Queen Atossa was held to be inventor of letter writing.

It was a bad guess, for letters written in clay in Babylonia and on papyrus in Egypt a thousand years or so before Queen Atossa was born were just waiting to be dug up. Nevertheless, down to current times, people have repeated that Greek tradition, crediting Persian Queen Atossa, wife of King Darius, with inventing systematic correspondence in the fifth century B.C.

Since scholars began eagerly translating every bit of inscribed clay or papyrus manuscript they could find, letters have disclosed that even stereotyped messages of current correspondence were thought up by the early letter writers. "I missed you Tuesday," and "love to the family" are as old as clay stationery.

The polite thought, "I hope you are well," was expressed in Babylonian days as "May Shamash keep thee healthy," Shamash being a god who dispelled evil spirits of disease.



The correct Babylonian letter writer began by naming the person addressed, even as modern writers do. Then he gave his own name, which looks like a good idea. Instead of turning the letter about and over to find out who sent it, as is part of reading a long letter today, the Babylonian learned in the first phrase who the letter was for, and in the second he discovered who was writing it. Simple and logical people, these Babylonians.

Clay envelopes were wrapped round Babylonian letters for protection and privacy. Egyptians rolled or folded and sealed their papyrus letters and addressed the outside. When a writer wanted his letter saved, the Babylonian phrase was "tuppi kil," meaning, keep my letter. Otherwise it was apt to be thrown away, like trash. It is from the trash heaps of Egypt that many ancient letters have been salvaged and read.

One love letter from a young man to his beloved, written in Babylonia about 2100 B.C., reads for all the world like letters written nowadays by people who find writing hard work. No poetry in this lover's letter, but he says a good deal on his small brick page:

#### "Keep Well for My Sake"

"To Bibea, thus says Gimil Marduk: May the gods Shamash and Marduk permit thee to live forever for my sake. I write to inquire concerning thy health. Tell me how thou art. I went to Babylon but did not see thee. I was greatly disappointed. Send the reason for thy leaving, that I may be happy. Do come in the month Marchesvan. Keep well always for my sake."

Almost every type of letter written today was made use of in early times. Besides begging letters, love letters, business letters, there are thank-you notes, letters that reprove, threaten, ask questions, propose marriage, make war and patch up quarrels.

An Egyptian king's letter to a political exile, trying to lure back the troublesome courtier by promising him a first-class funeral, is not so modern. It is hard to know where to class that one.

But a letter believed almost certainly to be written by Pharaoh Tutenkhamen's beautiful young widow, proposing marriage with a Hittite prince, is an international document that might have been written yesterday, considering the way that queens still move as pawns in the game of diplomacy.

To the Hittite king in the land north of Syria, the Egyptian queen said very simply:

"My husband is dead, and I have no son. They say you have many sons. If

you would give me one of them, he shall be my husband."

The Hittite king hesitated. He sent secretaries to look into the advisability of this Egyptian marriage. The widowed queen protested the delay. What happened then is blotted out of history, and no one knows—as yet—why the Hittites failed in this chance to ally themselves with Egypt. Apparently Tutenkhamen's widow wrote no more letters. Another man seized Egypt's throne.

Letters of good advice from fathers to sons are as "old as the hills," or at least as old as Egypt's ninth dynasty, some 2200 years before Christ.

#### An Egyptian Lord Chesterfield

The Egyptians made a literary classic of a letter of King Akhtoi to his son, very much as Lord Chesterfield's letters to his son, written in England in the 1740s, became famous.

The Egyptian king advised in his letter: "Be diplomatic in speech, in order that you may gain your point."

The British lord wrote, 2800 years later: "Never maintain an argument with heat and clamor, though you know yourself to be in the right."

The Egyptian king recommended truth: "If thou speakest truth in thy house, the nobles who are over the land will fear thee. It shall go well with an impartially minded sovereign, for it is the inside (of the palace) which conveys respect to the outside."

Chesterfield's way of putting a similar idea was: "Nothing but strict truth can

carry you through the world with either your character or your reputation unwounded, and as you jog along you will observe that the greatest fools are the greatest liars."

#### Good Advice to a Son

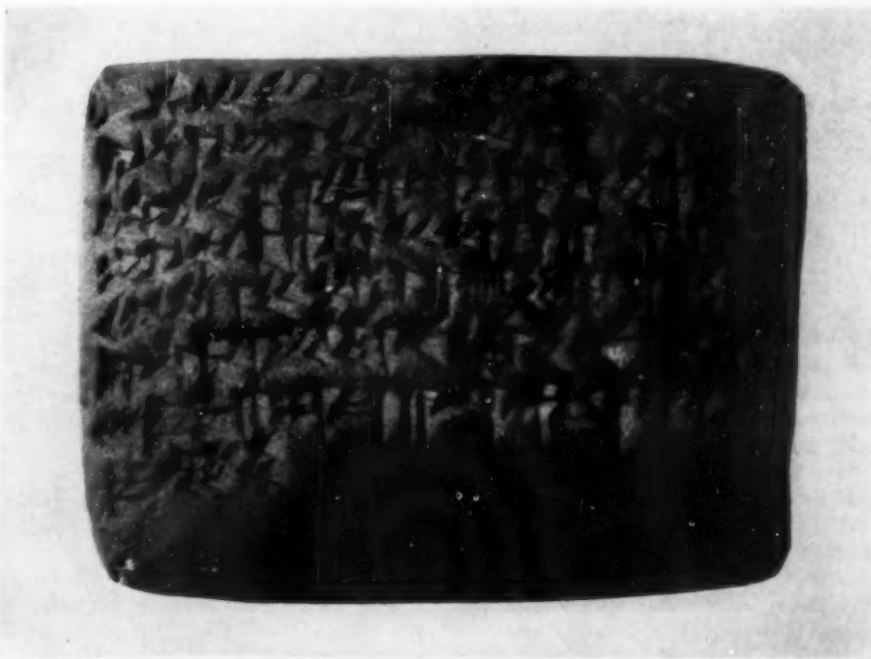
The Egyptian king warned his son: "Be not harsh, kindness is seemly. Establish thy monument in the love of thee."

And Chesterfield, echoing this sentiment which he did not know the Egyptian father had written, said: "Politeness is kindness. If you wish to determine whether an act is polite, ask yourself whether it is kind."

Not every sentiment in the Egyptian king's letter can be matched item for item, with one similar in Lord Chesterfield's advice, of course. But the fatherly wisdom of the Egyptian foreshadowed the British father on a good many points, showing that there is not much that is new in good advice, any more than in letter writing.

Scholars who pore over the world's oldest correspondence can appreciate the joke of the modern humorist who wrote to a friend: "I received your letter last week and am still enjoying it. Yesterday I got as far as 'Junior has the dumps' or could it be mumps?"

Many a short Babylonian epistle lasts a translator much more than a week, as he returns again and again to uncertainties in the text. Besides the fact that a letter may turn out to be on any conceivable subject, and per- (Turn to page 141)



#### SOLID LITERATURE

Queer as they look, the oldest letters in the world are surprisingly modern to read.

## EDUCATION

**Students Fake Accuracy When Given Impossible Task**

**E**DUCATORS who deplore the present emphasis on examinations in scientific courses of American universities are merely strengthening the delusion of youth that it should be possible to get an education without paying the price in hard work, according to Prof. Hosmer W. Stone of the University of California at Los Angeles.

Prof. Stone reported to the American Chemical Society on tests which he has made to determine how many students in elementary chemistry actually think about what they are doing.

In commenting on this paper he intimated that it is human nature to expend as little effort as possible in accomplishing a given task even if it is necessary to be a little dishonest.

In support of this opinion he cited his experiences with an ordinarily respectable group of chemistry students when faced by a problem of air analysis which could not be solved satisfactorily even by experts.

Just to see what they would do he set a practically impossible limit of error within which their solutions must fall in order to receive a passing grade.

Ninety-six per cent. of the students reported the impossible to get a passing grade. Later, when the same problem was presented under closer supervision only four students turned in passable results.

Prof. Stone added that many instructors who feel that they have raised scientific standards by demanding accuracy of a high order are doing so only at the expense of scientific integrity among students.

*Science News Letter, August 31, 1935*

## ECOLOGY

**Birds, Squirrels Credited With Planting of Forests**

**B**IRNAM Wood came to Dunsinane Hill, because Macduff's army carried it—or a considerable part of it—as camouflage. And that was the end of Macbeth, as everybody remembers.

But creatures considerably less husky than medieval Scottish soldiers still carry forests. Birds, squirrels and other small animals are important agents in reforestation, through their endless activities in carrying acorns and nuts, Dr. Joseph Grinnell, zoologist of the University of California, reminded his hearers in the course of an address given under the auspices of Science Service.

The birds and little animals carry the acorns only as prospective food, of course. But they drop some of them, and of the endless millions of them they bury or hide in crevices, there are hundreds of thousands they forget all about, and these subsequently get a chance to sprout and grow into trees.

Dr. Grinnell related one dramatic example of his own observation. He was up in the California foothills, among the oak woods when the acorns were dropping. It struck him, that all the acorns these trees bore must inevitably roll downhill; there was no way for them to roll up. That would be expected to result eventually in the migration of the forest down the slopes.

But then a bluejay flew uphill past him, carrying an acorn in its beak. Another jay passed, and another, and another. Jays flying uphill all carried acorns. Jays flying downhill carried none. Here was the means by which the California oak forest climbed its particular Dunsinane Hill.

Dr. Grinnell's talk was put on the air over the network of the Columbia Broadcasting System.

*Science News Letter, August 31, 1935*

## CHEMISTRY

**Science Explains Failures In Cranberry Jelly Making**

**S**CIENCE has come to the rescue of housewives, with an explanation of why their favorite recipe for making cranberry jelly sometimes won't work.

It's all on account of viscosity—a scientific word describing the flowing qualities of liquids. Chemists ascertain the relative viscosity of liquids by comparing them with water as to flowing quality. Thus, molasses has a viscosity many times that of water.

Reporting the results of their studies before the American Chemical Society meeting here today, George L. Baker and Ralph F. Kneeland of the Delaware Agricultural Experiment Station, say that a high viscosity means better jelly—up to a certain point. This, they found, is because pectin, the compound that actually makes jelly "jell," is most abundant in juices of a high viscosity.

One way viscosity can be increased is by the addition of sugar, since this makes a "heavier" and more slowly flowing liquid.

Studies at the Delaware Experiment Station show that far from being stable, the juices of ordinary "run of the market" cranberries have relative viscosities of anywhere from 40 to 132.

*Science News Letter, August 31, 1935*

**IN SCIENCE**

## BIOCHEMISTRY

**Fertility-Causing Vitamin Isolated as an Alcohol**

**V**ITAMIN E, the fertility vitamin without which female animals cannot produce young, appears to be one of the higher alcohols.

At the meeting of the American Chemical Society, evidence to that effect was presented by Drs. H. M. Evans, O. H. Emerson and G. A. Emerson of the University of California.

They made a concentrated extract of the vitamin-containing substance from wheat germ, known to be rich in vitamin E, and then by suitable chemical manipulation produced a crystalline substance so potent that laboratory animals were relieved of their sterility by a single dose of three milligrams—a less-than-pinhead sized bit.

Analysis of the substance showed it to be quite a complex higher alcohol, each molecule containing 29 atoms of carbon, 50 atoms of hydrogen and two of oxygen. Ordinary ethyl or grain alcohol has a much smaller molecule, consisting of 2 atoms of carbon, 6 of hydrogen and 1 of oxygen.

*Science News Letter, August 31, 1935*

## DENTISTRY

**Earliest Tooth Pastes Had Honey and Syrup Bases**

**A**LTHOUGH the peoples of ancient and medieval times used various substances for whitening their teeth, tooth paste as we know it today was not introduced until 1900.

Tracing the history of dentifrices from ancient times through the 19th century, Miss Martha E. Faulk has reported to the American Pharmaceutical Association that the immediate ancestors of tooth paste were certain "pasty substances" first made in 1847 from various chemicals blended with honey and syrup.

Although these, like tooth paste, were convenient and could be handily carried about, they also deteriorated very easily.

Two other predecessors of tooth paste were tooth tablets, introduced in 1868, and tooth soaps, which were "all the rage" from 1880 to 1900.

*Science News Letter, August 31, 1935*



# FIELDS

## METALLURGY

### Gold Recovered From Very Thin Solutions

**R**ECOVERY of gold from solutions where it is present in as small amounts as one part in four billion was reported before the American Chemical Society meeting by Dr. William E. Caldwell of Oregon State College.

Describing his process and its possibilities, Dr. Caldwell said that it makes possible rapid and accurate recovery of better than 95 per cent. of the gold in solution, and will be useful in removing gold from ores with a low percentage of gold content.

Since tests indicated that it was possible to recover up to 1/3,000,000 of an ounce of gold from 10.5 gallons of water, or one part in four billion, it was decided to apply the process to sea water. Accordingly samples were pumped from Puget Sound, and yielded 1/1,500,000 to 1/250,000 of an ounce for each metric ton of water. In other words, there is less than a tenth of a cent's worth of gold at the present market value in each ton of sea water. While the new process has proved its ability to extract gold from sea water, no claim is made that it can do so on a paying basis.

In the process, mercuric chloride and other chemicals are added to the solution containing gold, forming a precipitate which settles to the bottom where filtering, siphoning or other methods can recover it. Addition of lead and heating cause a minute gold bead to form.

The same method can be used to recover silver dissolved or suspended in minute quantities in solutions, although with not quite as high degree of accuracy.

*Science News Letter, August 31, 1935*

## FORESTRY

### Forests Catch Less Snow Than Bare Ground

**F**ULLY developed forests catch less winter snow than do completely denuded areas, but they regulate the melting of what they do catch, retaining it longer and releasing it more gradually.

These facts, important in the West where summer water supplies depend largely on the snows of the previous win-

ter, have been determined in a three-year snow-water study by C. A. Connaughton of the Intermountain Forest and Range Experiment Station.

Less snow accumulates on the forest floor largely because a considerable proportion—a quarter to a third—is intercepted by the thick tree tops and melts and evaporates into the air before it can reach the ground. But the greater amount of snow lying on the open ground melts and runs off rapidly in the spring, while the shade of the forest holds its snow in reserve for many days longer.

Brushland, which some investigators have claimed to be equal to forest in snow-conserving capacity, in Mr. Connaughton's studies proved to be even better than open ground in catching snow. But like the open ground it had little ability to keep the snow from melting rapidly when the spring sun got to work.

A compromise between forest and open land, giving some of the advantages of both, was found in forest with many small openings in it. This permitted snow to get through the interlaced canopy of tree tops, and at the same time gave the snow reserves the benefit of protecting shade in the spring.

Mr. Connaughton's investigation is reported in detail in the *Journal of Forestry* (June).

*Science News Letter, August 31, 1935*

## ANTHROPOLOGY

### Eyebrows a Bridge Between Neanderthals and Indians

**E**YEBROW ridges, heavy and prominent, give a decided "Neanderthaloid" appearance to a fragment of Indian skull dug up in Nebraska by Earl H. Bell of the University of Nebraska. Their possible significance is discussed in a report (*American Journal of Physical Anthropology*, April-June) by the finder and Dr. Ales Hrdlicka, curator of physical anthropology at the Smithsonian Institution.

Finds of this kind have been made a few times in the past, and on some occasions they have been made the basis of claims that Neanderthal men existed on this continent. Mr. Bell and Dr. Hrdlicka disagree with this opinion, holding instead to the view that the hereditary tendency to produce "Neanderthaloid" eyebrow ridges has persisted through the ages and crops up occasionally to cause confusion among archaeologists. The vast majority of Indians, both recent and ancient, have the same low eyebrow ridges that mark the skulls of all modern races.

*Science News Letter, August 31, 1935*

## MEDICINE

### New Technique Combats Cyanide Death Increase

**T**HE ALARMING rise in the number of deaths due to cyanide poisoning, from 243 in 1931 to 416 in 1933 within the U. S. registration area, has led to the development of a new method of reviving persons who have taken cyanide, usually with suicidal motives.

Described by K. K. Chen of the Lilly Laboratories of Indianapolis, Charles L. Rose, and G. H. A. Clowes, at the American Pharmaceutical Association meeting, it consists of successive injections of sodium nitrite and sodium thiosulfate.

This combination is claimed to be ten times as effective as methylene blue, one of the most commonly used antidotes. The method has proved successful in reviving several cases of actual poisoning, although one person had ingested about five grams of potassium cyanide, an ordinarily fatal dose, before the injections could be administered.

*Science News Letter, August 31, 1935*

## MEDICINE

### Iron Content of Blood Has Effect on Sunburn Severity

**P**AINFUL sunburn, blistering and burning the skin of normal individuals, can be lessened or prevented by the administration of doses of iron, Dr. Howard L. Eder of the Santa Barbara Clinic has reported.

Iron therapy will also increase the resistance to sunburn of individuals more than normally susceptible to the sun's ultraviolet rays. By using iron, fair, red-haired individuals, usually chronic sufferers from freckles and blistering, can be made to stand an average exposure.

Cases known to be sensitive to sunburn were tested before and after being given the iron treatments. There was a marked increase of ultraviolet ray tolerance after the treatment, as well as improvement in color, appetite, and other signs of health. Ruddy, bronzed skin replaced raw, inflamed tissue.

Citing clinical cases to demonstrate his point, Dr. Eder said that observations indicate the blood of the human body to be "a parasite, living on other body tissues." If such is the case, the hemoglobin test now in use is not a sure way of learning a person's iron reserve, or signs of anemia, since the blood hemoglobin would maintain itself as long as it could draw upon iron reserves of the other organs of the body to supply its needs.

*Science News Letter, August 31, 1935*

## ASTRONOMY

# Full Moon Close; Tides High

**During September Moon's Closest Approach to Earth Comes at Full Phase, With Cumulative Effect on Ocean**

By JAMES STOKLEY

**V**ENUS, which shone so brilliantly in the western evening sky during the spring and summer, has disappeared from view, but Saturn has appeared in the east to take its place, and this month still has three planets on the celestial stage. Jupiter and Mars are low in the southwest, close together, setting between two and three hours after the sun. Jupiter can be identified because of its brilliance; Mars is farther east and red in color; though considerably fainter than Jupiter it is brighter than most of the stars in this part of the sky. These two planets are not shown on the accompanying maps, because they have disappeared below the horizon before the time for which the charts are drawn, that is, 10:00 p. m., Sept. 1, 9:00 p. m., Sept. 15, and 8:00 p. m., Sept. 30. The third planet, Saturn, is shown in the constellation of Aquarius, where its brilliant and steady glow makes its readily apparent.

The most conspicuous constellation seen on September evenings shines directly overhead—Cygnus, the swan, sometimes called the northern cross. The swan's tail extends to the northeast, and is marked by the star Deneb, brightest in the constellation. The neck extends in the other direction, and is terminated by Albireo, which represents the beak of the swan. This is also the bottom of the cross. The stars that represent the arms of the cross are also the wings of the bird, outstretched in flight.

## Vega Now Brightest Star

West of Cygnus appears the brightest star seen in the sky these evenings, Vega, in Lyra, the lyre. To the south is Aquila, the eagle, with the brilliant Altair. Close to Altair are two of the smallest constellations in the sky, this month in their best position. Above it is Sagitta, the arrow, horizontal, and flying eastward. Farther east is Delphinus, the dolphin, in which can be seen a diamond-shaped group of stars called, for some unknown reason, "Job's coffin."

Three other first magnitude stars can be seen this month in the evenings, but they are all very low, so near the horizon, in fact, that they will be rivalled in brilliance by fainter stars, more favorably

placed higher in the sky. To the southeast, below Aquarius, the water carrier, is Piscis Austrinus, the southern fish. These two constellations are very closely connected, for the old star maps represent the former as an old, bearded man, carrying a jar from which is flowing a stream of water into the mouth of the fish. In the fish is the star Fomalhaut, about all of the constellation that can be seen easily from most parts of the United States.

## Bootes Follows the Bear

Low in the northwest is Arcturus, in Bootes, the bear-driver. This can be easily located by following the curved line made by the handle of the great dipper, which is low in the sky, farther north. During the early Summer Bootes was high in the sky, but now it is disappearing from view for a time. In the northeast can be seen Capella, in Auriga, the charioteer. This rises higher later in the evening, and during the autumn and winter will become more and more prominent.

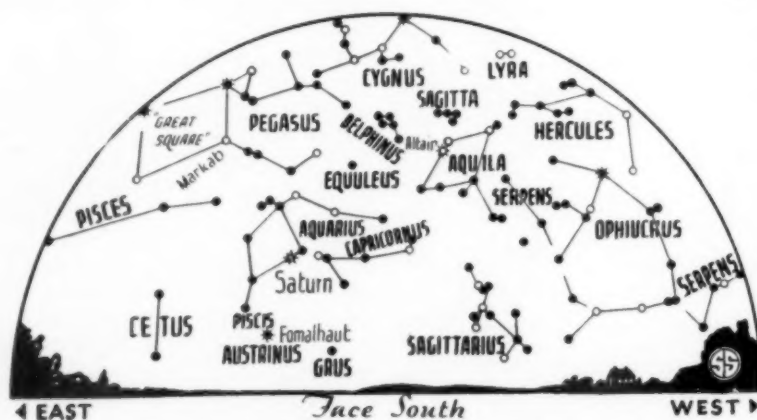
Every 29 days the moon goes through its phases in the familiar manner, appearing full when opposite the sun, for then the entire sunlit half is turned towards us. About a week later, when it is at right angles to the sun, we see but half of the bright hemisphere, or a quarter of the complete moon, and we call this last quarter. Then it is not visible in the evening, for it rises at midnight. After

about another week, it is in almost the same direction as the sun, and as the bright portion is turned completely away from us, it cannot be seen at all, then is the phase of new moon. But a couple of days after new, a narrow sliver of the bright hemisphere is turned towards us, which we see as a narrow crescent low in the west just after sunset, for then it has moved to the east, and sets a little while after the sun. Gradually, more and more of the bright side turns to us, and, about a week after new moon, we again see half of the illuminated side, which we call first quarter. After this it passes through a "gibbous" phase, until it is full again. During September, the moon will be at first quarter on the 5th, full on the 12th, at last quarter on the 19th and new on the 27th.

## Phases and Distance Both Change

At the same time that it is changing its phases, the moon changes its distance, for its orbit, its path around the earth, is not a true circle, but an ellipse. On the average, its distance is 238,857 miles, but it can come as close as 221,463 miles or recede as far as 252,710 miles from the center of the earth. However, the change in distance does not keep step with the phases. When the moon is closest, it is said to be at "perigee," and after it has made a complete trip around the earth, and is back in the same direction among the stars, it is closest again. But it has not returned to the same phase. This depends upon its direction in relation to the sun, and during the period of about 27 1/3 days that it has taken to encircle the earth, our planet itself has been trav-

## \* \* \* SYMBOLS FOR STARS IN ORDER OF BRIGHTNESS



VENUS GONE; SATURN AND MARS REMAIN

eling about a thirteenth of its complete annual journey westwards around the sun. The result is that we see the sun farther east, among the stars in the background, than we did before, and the moon has to travel about two days more before it is as far ahead of the sun as it was before. The moon is full every 29½ days; this is called the synodic month; while the other period, in which the moon actually goes around the earth, is called the sidereal month. This causes the times of perigee and apogee, the point at which it is farthest from earth, to shift around at different times with relation to the phases.

#### Closest of Year

But during September it happens that perigee occurs at 1:06 p. m., Eastern Standard Time, on the 12th, 2 hours 12 minutes before full moon. Even though the moon comes to perigee each month, it is not always the same distance, and it further happens that the one during September is the closest of the year. At that time it will be only 221,750 miles away. In contrast, when it was at perigee in May, it was 229,650 miles from us. Apogee, this month, comes on the 25th, at 11:36 p. m., with 252,750 miles separating us.

All these things have an important bearing on the height of the tides. As is well known, these are caused by the gravitational pull of the sun and of the moon, particularly the latter. Even though it has so much less mass than the sun, it is so much closer that its tide-producing effect is more than twice as great. The force of the gravitational pull between two bodies varies with the square of their distance. The part of the earth nearest the moon, therefore, is attracted more than its center, and there is a tendency to pull the surface up at the point where the moon is overhead. A very slight effect of this kind on the solid ground has been detected, but it is more noticeable in the ocean, where the water can respond more readily, so there is a rather large bulge. Also, the earth itself is pulled more strongly than the water on the side of the earth opposite from the moon, and there is another bulge in that direction. These two bulges follow the moon as the earth turns on its axis, the



THE BEAR-DRIVER GOES; THE CHARIOTEER COMES

friction delaying them a little after the place where the moon is highest in the sky. And, of course, the water in these bulges must come from some place, so there is an area of low water half way between them. For a person on the sea-coast, high tide comes when one of the bulges is going past, low tide when the depression reaches him.

The sun's effect is about 5/11 of the moon's, and so it also produces two bulges and two low spots. When the moon is new, or full, the bulges from the attraction of the two bodies, which are then in line, coincide, and we have extra high, high tides and extra low, low tides, which are called the spring tides. At first and last quarter, the solar and lunar

tides tend to cancel each other, the range from high to low each day is much less and then we have the neap tides.

As the moon changes its distance from earth, the tide raising effect is altered. At perigee the tidal range is about a fifth greater than when the moon is most distant. Therefore, when the moon is new or full at the time it is in perigee, the difference between high and low tide is greatest of all. As that happens this month, people who live near the sea or bodies of water connected with it will probably see the highest high tides and the lowest low tides of the year, with the moon almost as close as it can possibly come.

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#### ARCHAEOLOGY

## Honey Given to Dead In Old German Burials

**D**EAD MEN ate honey, in the after-world of the ancient Central European religion.

That at least is the inference that seems likely, from evidences dug out of ancient burials in Germany, as analyzed under the microscope of Prof. Johannes Grüss of Berlin. (*Forschungen und Fortschritte*, July 10/20). For many years, Prof. Grüss has been building a wide reputation for his painstaking researches in what might be termed "micro-archaeology"—examination under the microscope of such minutiae as starch grains, yeast cells and shreds of fibers found in ancient ruins and tombs.

His newest investigation has to do with the contents of a little pottery vessel found in a log coffin in an ancient Allemannic cemetery by archaeologists of the Stuttgart Museum. Mingled with the

fine-grained clayey debris that filled it were masses of recognizable pollen grains and a quantity of yeast cells. There were also minute bits of flower petals and wheat-grain fragments.

The wheat-grain fragments argued a funeral gift of bread, a not uncommon find with the dead of all lands. The pollen grains and petal debris indicated that honey was at one time present. This was confirmed when Prof. Grüss made a test for sugar, and found a small but quite definitely measurable quantity.

What had become of the honey itself was shown conclusively enough by the remains of the yeast cells. The burial had been in a moist place. The honey had absorbed water enough to dilute it. The yeast, already present, had fermented most of it to alcohol, which in the course of time vanished.

#### Phases of the Moon

First Quarter . . . . .	Sept. 5
Full Moon . . . . .	Sept. 12
Last Quarter . . . . .	Sept. 19
New Moon . . . . .	Sept. 27



A considerable proportion of the pollen grains were well enough preserved to permit their identification. They came from a considerable variety of flowers: dandelion, hawkweed, cherry, heather, rose, snowdrop and a number of other

species of wild plants.

Honey was not by any means a common funeral gift among the ancient Germans, Prof. Grüss remarks. Presumably it was not very easy to get.

*Science News Letter, August 31, 1935*

## PHYSICS

## Multiple Lightning Strokes Crush Strong Wires

Internal Pressures of From 10,000 to 20,000 Pounds Per Square Inch May be Built up in .8-Inch Core

**D**ESTRUCTIVE lightning strokes which shatter a tree or telephone pole, burst a block of concrete through which a wire runs or dig a hole in the ground are the result of too much confinement, reports P. L. Bellaschi, engineer of the Westinghouse Electric and Manufacturing Company laboratories (*Electrical Engineering*, August).

If the core of the lightning stroke is confined within a bore having a diameter less than about eight tenths of an inch, internal pressures may be built up of anywhere between ten to twenty thousand pounds to the square inch. Few natural materials will stand such forces and naturally blow up.

Electrical engineers were led to investigate the shattering of wires by lightning strokes because of the paradox that small wires were known to be able to withstand high currents comparable with those of lightning and yet were sometimes fused and destroyed by lightning, Mr. Bellaschi will report in a paper to be delivered at the forthcoming meeting of the American Institute of Electrical Engineers in Seattle, Wash.

The secret, the electrical engineer reveals, appears to be that many lightning strokes are not single discharges but multiple ones. Lightning, in other words, sometimes strikes anywhere from five to ten times in the same place within a fraction of a second.

From a collection of experimental data gathered in a study of lightning with a super-speed camera it was found that 80 per cent. of the lightning strokes were single ones. The other 20 per cent. were of a multiple nature.

The multiple flashes are suspected of being the ones which crush large hollow cylinders, fuse telephone wires and other heavy-current carrying electrical leads.

Laboratory tests showed that very heavy lightning strokes, having currents

up to 200,000 amperes, would be needed to destroy conducting equipment in the manner authentically reported. The cumulative effect of several more moderate strokes coming one on top of the other is believed to explain the lightning paradox.

*Science News Letter, August 31, 1935*

## ENGINEERING

## Giant Lightning Arresters Built for Boulder Dam

**T**HE first of the twelve giant lightning arresters which will protect the power transmission lines from Boulder Dam to Los Angeles against lightning has now been completed. The arresters are 45 feet high, weigh 4,500 pounds and are rated at 287,000 volts.

The strip of brass wire cloth shown in picture was used in artificial lightning tests to simulate the steel tower on which the arrester will hang in actual service.

Insulating material of the arresters is the new substance Thyrite, for whose discovery Karl B. McEachron of the General Electrical Company received the Edward Longstreth Medal of The Franklin Institute, Philadelphia.

*Science News Letter, August 31, 1935*

The wood of the Osage orange tree was valued by Indians as material for bows and war clubs.

When tin cans were novel containers for food, tinsmiths made cans by hand at the rate of about 60 a day.

The Seventh Pan American Child Congress will be held in Mexico City in October of this year.

To salvage the diamonds in the gravel bed of the Vaal River, South Africa, a large part of the river has been diverted.

## PHYSICS

## Nitrogen Afterglow Hints Possible New Lamp Type

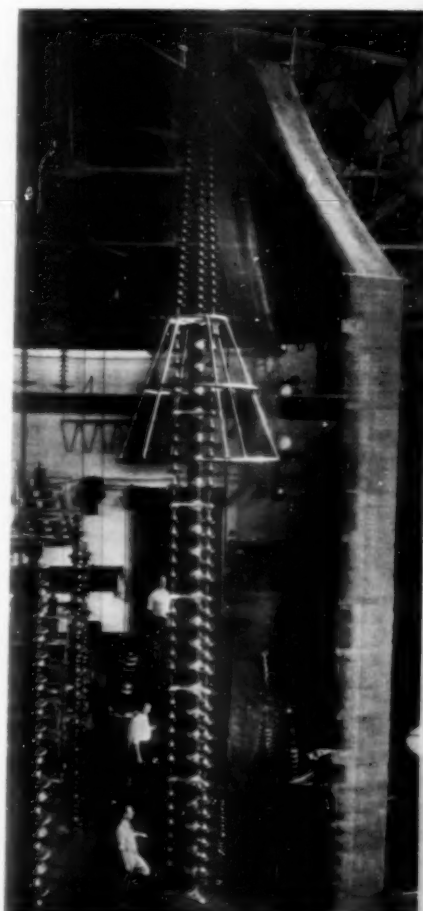
**T**HE FUTURE may bring a new form of illumination for domestic and commercial use which will supersede all other forms now in use, Prof. W. H. Rodebush of the University of Illinois has predicted.

He referred to the afterglow of nitrogen which occurs when this gas is placed in a glass tube with small amounts of oxygen and subjected to low pressure electrical discharges.

Among the virtues which this form of light appears to have is a practically complete conversion of electrical energy into light with no detectable waste in the form of heat.

Furthermore, it does not require continuous supplies of electrical energy, for under some conditions the afterglow lasts for hours after the electrical discharge is stopped. By proper mixture of gases used, light can be produced which approximates the ideal "white" light of the sun.

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## From Page 135

haps so worded as to be understood only by the writer and the person addressed, old letters are often badly damaged. In Babylonian letters this means a broken or worn-down surface, so that the wedge-shaped characters that the scribe marked in the clay when it was soft, are no longer plain writing.

So frequent was this damage in the letters that Dr. Alexander read recently, that he found scarcely a tablet in perfect condition. Careless handling by Arabs who dig up relics, and the action of the elements, are held mainly responsible for the bad condition in which the old clay-brick letters reach translators' hands today. Archaeologists can scarcely complain of the Babylonians, however, for the correspondence that is being turned out today will provide far less helpful material for future civilizations to read and wonder over. So fragile is modern paper that it falls to pieces in record vaults, and no one need worry over archaeologists reading his private letters 4,000 years hence.

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Science News Letter, August 31, 1935

## PLANT PATHOLOGY

## Sugarcane Substance Fights Virus of Mosaic

**S**UGARCANE fights mosaic disease, one of the worst of the ills that afflicts it, with a virus-paralyzing substance it forms in the growing tips of its stalks, a stuff that seems to be somewhat analogous to the germ-fighting "anti-bodies" formed in the bodies of human beings and animals when invaded by disease. This discovery has been made by Drs. E. W. Brandes and Julius Matz, plant pathologists of the U. S. Department of Agriculture.

They found that when juice extracted from healthy tissue taken from near the growing tips was mixed with juice from mosaic-sick plants, known to contain the virus, and the mixture then injected into healthy canes, the resulting infection was much less severe than "control" infections caused by mixed virus-containing juice. The nature of the virus-paralyzing substance is still unknown; as is, indeed, the nature of the virus itself. The latter belongs to the group of disease-causers known to science as "filter-passers," be-



## FILING CASES

Business men in Babylon and other ancient civilizations handled mail orders and kept office files. This pigeon-hole file for storing papyrus records was unearthed in Dura-on-the-Euphrates, and is almost 2000 years old. (Courtesy Gallery of Fine Arts, Yale University.)

## BIOPHYSICS

## Plants' Fluorescent Light Clue to Photosynthesis

**F**LUORESCENT light, a strange luminescence given off by plants when they are subjected to ultraviolet and certain other kinds of rays, may yield a clue to the still unsolved riddle of how plants capture and use sunlight in making their own food out of water and carbon dioxide. This is the suggestion of Dr. James Franck, noted German physicist and sharer in the Nobel Prize for physics in 1925.

A plant's food-making activity and its fluorescence, Dr. Franck pointed out, are inversely proportional to each other. The greater the amount of sun-energy plants re-emit as light, the less they have to use in the tiny food-factories in their cells.

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## CHEMISTRY

## Pasteurization of Wine Recommended by Chemists

**P**ROFITING by the favorable experience of infants in arms and others with pasteurized milk, during the interlude of prohibition, the wine industry is now ready to adopt pasteurization as a routine process in the preparation of its bottled goods.

This fact became known through a report submitted to the American Chemical Society by J. E. Goresline and E. A. Beavens of the bureau of chemistry and soils, U. S. Department of Agriculture, and Carl S. Pederson of the New York State Agricultural Experiment Station.

The object of wine pasteurization, the authors of the report explained, is not to protect customers from any lurking diseases in wine but to prevent souring and other kinds of deterioration which might give the wine an undesirable taste. At the time of harvest the grapes and stems have many bacteria, molds and wild yeasts on them. After the fermentation process in the crushed grapes has proceeded to the desired point, the further growth of yeast and other microscopic forms of life must be stopped if the wine is to remain palatable. After investigating various methods of accomplishing this, the three scientists concluded that pasteurization is the best.

Either dry wines or sweet wines of low alcoholic content lend themselves to pasteurization. They recommended heating the wine in bottles at 130 degrees Fahrenheit for twenty minutes. Higher temperatures may give the wine a "cooked" flavor.

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The leopard has longer legs than his cousin, the American jaguar, and is probably a better runner.

A considerable proportion of the pollen grains were well enough preserved to permit their identification. They came from a considerable variety of flowers: dandelion, hawkweed, cherry, heather, rose, snowdrop and a number of other

species of wild plants.

Honey was not by any means a common funeral gift among the ancient Germans, Prof. Grüss remarks. Presumably it was not very easy to get.

*Science News Letter, August 31, 1935*

## PHYSICS

## Multiple Lightning Strokes Crush Strong Wires

Internal Pressures of From 10,000 to 20,000 Pounds Per Square Inch May be Built up in .8-Inch Core

**D**ESTRUCTIVE lightning strokes which shatter a tree or telephone pole, burst a block of concrete through which a wire runs or dig a hole in the ground are the result of too much confinement, reports P. L. Bellaschi, engineer of the Westinghouse Electric and Manufacturing Company laboratories (*Electrical Engineering*, August).

If the core of the lightning stroke is confined within a bore having a diameter less than about eight tenths of an inch, internal pressures may be built up of anywhere between ten to twenty thousand pounds to the square inch. Few natural materials will stand such forces and naturally blow up.

Electrical engineers were led to investigate the shattering of wires by lightning strokes because of the paradox that small wires were known to be able to withstand high currents comparable with those of lightning and yet were sometimes fused and destroyed by lightning. Mr. Bellaschi will report in a paper to be delivered at the forthcoming meeting of the American Institute of Electrical Engineers in Seattle, Wash.

The secret, the electrical engineer reveals, appears to be that many lightning strokes are not single discharges but multiple ones. Lightning, in other words, sometimes strikes anywhere from five to ten times in the same place within a fraction of a second.

From a collection of experimental data gathered in a study of lightning with a super-speed camera it was found that 80 per cent. of the lightning strokes were single ones. The other 20 per cent. were of a multiple nature.

The multiple flashes are suspected of being the ones which crush large hollow cylinders, fuse telephone wires and other heavy-current carrying electrical leads.

Laboratory tests showed that very heavy lightning strokes, having currents

up to 200,000 amperes, would be needed to destroy conducting equipment in the manner authentically reported. The cumulative effect of several more moderate strokes coming one on top of the other is believed to explain the lightning paradox.

*Science News Letter, August 31, 1935*

## ENGINEERING

## Giant Lightning Arresters Built for Boulder Dam

**T**HE first of the twelve giant lightning arresters which will protect the power transmission lines from Boulder Dam to Los Angeles against lightning has now been completed. The arresters are 45 feet high, weigh 4,500 pounds and are rated at 287,000 volts.

The strip of brass wire cloth shown in picture was used in artificial lightning tests to simulate the steel tower on which the arrester will hang in actual service.

Insulating material of the arresters is the new substance Thyrite, for whose discovery Karl B. McEachron of the General Electrical Company received the Edward Longstreth Medal of The Franklin Institute, Philadelphia.

*Science News Letter, August 31, 1935*

The wood of the Osage orange tree was valued by Indians as material for bows and war clubs.

When tin cans were novel containers for food, tinsmiths made cans by hand at the rate of about 60 a day.

The Seventh Pan American Child Congress will be held in Mexico City in October of this year.

To salvage the diamonds in the gravel bed of the Vaal River, South Africa, a large part of the river has been diverted.

## PHYSICS

## Nitrogen Afterglow Hints Possible New Lamp Type

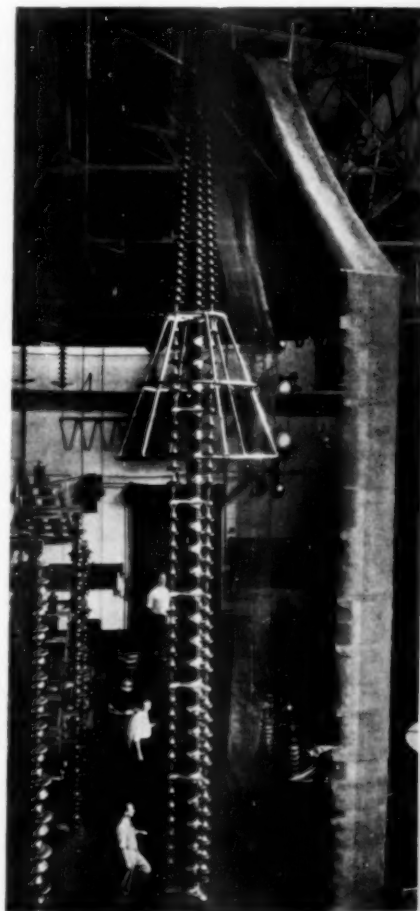
**T**HE FUTURE may bring a new form of illumination for domestic and commercial use which will supersede all other forms now in use, Prof. W. H. Rodebush of the University of Illinois has predicted.

He referred to the afterglow of nitrogen which occurs when this gas is placed in a glass tube with small amounts of oxygen and subjected to low pressure electrical discharges.

Among the virtues which this form of light appears to have is a practically complete conversion of electrical energy into light with no detectable waste in the form of heat.

Furthermore, it does not require continuous supplies of electrical energy, for under some conditions the afterglow lasts for hours after the electrical discharge is stopped. By proper mixture of gases used, light can be produced which approximates the ideal "white" light of the sun.

*Science News Letter, August 31, 1935*



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## From Page 135

haps so worded as to be understood only by the writer and the person addressed, old letters are often badly damaged. In Babylonian letters this means a broken or worn-down surface, so that the wedge-shaped characters that the scribe marked in the clay when it was soft, are no longer plain writing.

So frequent was this damage in the letters that Dr. Alexander read recently, that he found scarcely a tablet in perfect condition. Careless handling by Arabs who dig up relics, and the action of the elements, are held mainly responsible for the bad condition in which the old clay-brick letters reach translators' hands today. Archaeologists can scarcely complain of the Babylonians, however, for the correspondence that is being turned out today will provide far less helpful material for future civilizations to read and wonder over. So fragile is modern paper that it falls to pieces in record vaults, and no one need worry over archaeologists reading his private letters 4,000 years hence.

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Science News Letter, August 31, 1935

## PLANT PATHOLOGY

## Sugarcane Substance Fights Virus of Mosaic

**S**UGARCANE fights mosaic disease, one of the worst of the ills that afflicts it, with a virus-paralyzing substance it forms in the growing tips of its stalks, a stuff that seems to be somewhat analogous to the germ-fighting "anti-bodies" formed in the bodies of human beings and animals when invaded by disease. This discovery has been made by Drs. E. W. Brandes and Julius Matz, plant pathologists of the U. S. Department of Agriculture.

They found that when juice extracted from healthy tissue taken from near the growing tips was mixed with juice from mosaic-sick plants, known to contain the virus, and the mixture then injected into healthy canes, the resulting infection was much less severe than "control" infections caused by mixed virus-containing juice. The nature of the virus-paralyzing substance is still unknown; as is, indeed, the nature of the virus itself. The latter belongs to the group of disease-causers known to science as "filter-passers," be-



## FILING CASES

*Business men in Babylon and other ancient civilizations handled mail orders and kept office files. This pigeon-hole file for storing papyrus records was unearthed in Dura-on-the-Euphrates, and is almost 2000 years old. (Courtesy Gallery of Fine Arts, Yale University.)*

## BIOPHYSICS

## Plants' Fluorescent Light Clue to Photosynthesis

**F**LUORESCENT light, a strange luminescence given off by plants when they are subjected to ultraviolet and certain other kinds of rays, may yield a clue to the still unsolved riddle of how plants capture and use sunlight in making their own food out of water and carbon dioxide. This is the suggestion of Dr. James Franck, noted German physicist and sharer in the Nobel Prize for physics in 1925.

A plant's food-making activity and its fluorescence, Dr. Franck pointed out, are inversely proportional to each other. The greater the amount of sun-energy plants re-emit as light, the less they have to use in the tiny food-factories in their cells.

Science News Letter, August 31, 1935

## CHEMISTRY

## Pasteurization of Wine Recommended by Chemists

**P**ROFITING by the favorable experience of infants in arms and others with pasteurized milk, during the interlude of prohibition, the wine industry is now ready to adopt pasteurization as a routine process in the preparation of its bottled goods.

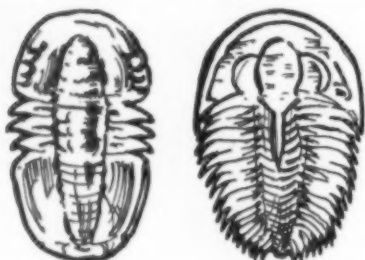
This fact became known through a report submitted to the American Chemical Society by J. E. Goresline and E. A. Beavens of the bureau of chemistry and soils, U. S. Department of Agriculture, and Carl S. Pederson of the New York State Agricultural Experiment Station.

The object of wine pasteurization, the authors of the report explained, is not to protect customers from any lurking diseases in wine but to prevent souring and other kinds of deterioration which might give the wine an undesirable taste. At the time of harvest the grapes and stems have many bacteria, molds and wild yeasts on them. After the fermentation process in the crushed grapes has proceeded to the desired point, the further growth of yeast and other microscopic forms of life must be stopped if the wine is to remain palatable. After investigating various methods of accomplishing this, the three scientists concluded that pasteurization is the best.

Either dry wines or sweet wines of low alcoholic content lend themselves to pasteurization. They recommended heating the wine in bottles at 130 degrees Fahrenheit for twenty minutes. Higher temperatures may give the wine a "cooked" flavor.

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The leopard has longer legs than his cousin, the American jaguar, and is probably a better runner.



Cromwell's Two Skulls

WE COMMONLY think of the fossil remains of an animal as something final and conclusive, like a tombstone. Here, we can say, a dinosaur, or a mammoth, or a man, laid him down to die, and here, thanks to lucky accidents of the right kind of burial, the trickling of mineral-charged water, and other suitable conditions, part or all of the bones became fossilized.

But one animal leaving more than one complete fossil? That smacks too much of the old story of the provincial museum in England, which boasted the possession of two skulls of Oliver Cromwell, one taken when he was a little boy, the other his grown-up-man skull. No. One animal, one fossil skeleton: that would seem to be only common sense.

It is only common sense, insofar as it is limited to animals that wear their skeletons inside, as we do, and as the dinosaurs did—and likewise Oliver Cromwell. But there are plenty of animals, and have been in all geologic ages, that wear their skeletons outside, and shed them periodically, to appear in new ones. Lobsters and crayfish, scorpions and insects do that nowadays; you frequently find their shed "skins."

## ● RADIO

Tuesday, September 3, 3:30 P. M., E.S.T.  
OUR HIGHWAYS, ARTERIES OF THE NATION, by Dr. S. S. Steinberg, University of Maryland.

Tuesday, Sept. 10, 3:30 p. m., E.S.T.  
AMERICA'S EARLIEST MAN, by Charles Amsden, Secretary, Southwest Museum.

In the Science Service series of radio addresses given by eminent scientists over the Columbia Broadcasting System.

So also in past ages did the primitive relatives and ancestors of the lobster-crayfish tribe, ranging from the lowly trilobites which are among the earliest of all known fossils, up through the six-foot "sea-scorpions" or eurypterids, and the armor-cased ostracoderms which apparently were the ancestors of fishes, and through them of all other vertebrates.

These animals were for the most part dwellers in or on the silty bottoms of quiet waters. When they outgrew their shells and cast them off, the discarded outer skeletons were left on the bottom,

### ECOLOGY

## Native Grasses Most Efficient In Holding Soil Against Water

EROSION resistance of a given type of soil varies greatly according to the kind of vegetation growing on it and the way that vegetation has been treated.

This fact was dramatically developed in a series of direct tests on samples of prairie soil, carried out by Prof. J. E. Weaver of the University of Nebraska and Dr. George W. Harmon of the U. S. Soil Conservation Service. Their results are reported in a special bulletin of the Conservation and Survey Division of the University of Nebraska.

Drs. Weaver and Harmon lifted several four-inch-deep samples of prairie soil intact from their places, enclosed in secure wooden frames. These frames were placed on a washing frame with a ten per cent. slope, and a hose played back and forth over them under uniform conditions of flow and pressure, after all top growth had been shorn off. The time was measured, in which the various soil samples were washed away.

The sample of big bluestem sod proved highly resistant. Superficial soil was washed off in a muddy stream in between five and eight minutes, but after that the matted roots held the rest of the mass firmly for over two hours. Only at the end of two hours and forty minutes of hard "squirting" with a small stream of water were the roots robbed of their soil.

A second test with big bluestem showed the comparative resistances of ungrazed sod. The ungrazed sample held its soil against the water's attack for 3 hours 28 minutes; the grazed sample yielded almost an hour sooner.

Little bluestem grass and needlegrass samples resisted for 3 hours 32 minutes and 3 hours 20 minutes respectively.

frequently to be silted over and eventually to harden into rock.

One trilobite or ostracoderm could thus easily leave ten or a dozen outgrown suits of armor-skeleton, of which several or all might become fossilized. One museum might, therefore, by lucky chance possess two or more fossils of the same animal—just as the historic museum of the old tale might really have made good on a boast of having two of Oliver Cromwell's cavalry breastplates, one from the time when he was young and slim, the other from his more robust maturity.

Science News Letter, August 31, 1935

The soil-binding power of weeds proved negligible, in comparison with that of the grasses. A sample in the annual-weed stage was completely washed away in 41 minutes.

Clean-cultivated cornfield soil was even weaker, though it contained a couple of cornstalks and their upper roots. It was a complete washout in 18 minutes.

Science News Letter, August 31, 1935

### BIOLOGY

## Turtle's Tank-Like Armor Not a Certain Defense

See Front Cover

OVERDEVELOPMENT of defensive armor has been demonstrated as a weakness and a snare time after time in the history of life on earth, yet there are animals that persist in it still. Turtles and tortoises for millions of years have been depending on their horny cuirasses, disdaining the use of claws and teeth, or of long legs to run away when they cannot fight. Coupled with ability to conceal themselves in mud or under earth, plus a fair prolificity in reproduction, it has "got them by."

Some of the early saurians did the same kind of thing; and there were also the glyptodonts and the plate-armored knights of the fifteenth century. But always, when a creature has put too much dependence on an impenetrable shell, there has come a stronger, who taketh away the armor wherein he trusteth, and distributeth the spoils—whether it be a tyrannosaur, or a saber-tooth cat, or a yeoman with long-bow and clothyard shaft, or a vacationing small boy with a chunk of rock.

Science News Letter, August 31, 1935

# •First Glances at New Books

Additional Reviews  
On Page 144

## Medicine

**THE DOCTOR'S BILL**—Hugh Cabot—*Columbia Univ. Press*, 313 p., \$3. The difficult but important problem of providing adequate medical care for the American people and adequate incomes for American doctors is remarkably well presented in this volume. It is easy to read, in spite of the complexities of the subject. It is concise. It is unbiased. The author's opinions are valuable because they are based on first hand experience in private medical practice, as a medical educator, and as a member of the staff of a large medical clinic. Every physician and every layman taking part in discussions of the subject would do well to read this book.

*Science News Letter*, August 31, 1935

## Physiology

**THE GLANDS OF LIFE**—Herman H. Rubin—*Bellaire*, 164 p., \$2. The author's vivid style makes his book highly readable. It is unfortunate, however, that in a book intended for lay reading he has not tempered his enthusiasm over modern discoveries about the endocrine glands and the usefulness of gland extracts in medical practice.

*Science News Letter*, August 31, 1935

## Physiology and Health

**HEALTH AND THE HUMAN BODY**—S. Weir Newmayer and Edwin C. Broome—*American Book Company*, 398 p., 96c. Teachers will probably find this a useful text for upper grades of elementary schools.

*Science News Letter*, August 31, 1935

## Mathematics

**MATHEMATICS AND THE QUESTION OF COSMIC MIND; WITH OTHER ESSAYS**—Cassius Jackson Keyser—*Scripta Mathematica*, 121 p., 75c. To those who can speak and understand the language of mathematics, a little at any rate, this small collection of essays will open many interesting doors of thinking.

*Science News Letter*, August 31, 1935

## Zoology

**FAUNA OF THE NATIONAL PARKS OF THE UNITED STATES: WILDLIFE MANAGEMENT IN THE NATIONAL PARKS**—George M. Wright and Ben H. Thompson—*Government Printing Office*, 142 p., 20 cents. Discussions of problems created by the development of the National Parks as educational and recreational areas for large numbers of people, and of measures toward their solution being taken and in contemplation. Practical

yet not technical; the layman reading this book can understand it, and understanding it will be better able to make his own contributions as a citizen-owner of the National Park System.

*Science News Letter*, August 31, 1935

## Astrophysics-Meteorology

**SOLAR RADIATION AND WEATHER STUDIES**—C. G. Abbot—*Smithsonian Institution*, 89 p., 3 pl., free. (If ordered through Science Service, please include 10 cents for handling charges.) Dr. Abbot here brings to a head the results of his long researches on periodicity in solar radiation. He finds a 23-year cycle dominant. (See SNL, Aug. 24, p. 115.)

*Science News Letter*, August 31, 1935

## Gardening

**WEEK END GARDENING**—Sterling Patterson—*Macmillan*, 255 p., \$2.50. A well-planned schedule for a season's work in the not-too-pretentious garden that the average suburban citizen can manage in his not-too-abundant leisure. It starts with paper plans in January, winds up with houseplants in December. The full-page halftone illustrations are very helpful, the text style is chatty, and the humorous little line drawings here and there add enlivenment.

*Science News Letter*, August 31, 1935

## Botany

**EVOLUTION OF FOLIAR TYPES, DWARF SHOOTS, AND CONE SCALES OF PINUS**—Clifton Childress Doak—*University of Illinois*, 106 p., 32 figures, \$1.50.

*Science News Letter*, August 31, 1935

## Psychology

**WHY WE FEEL THAT WAY**—Augustus W. Trettien—*Stratford*, 452 p., \$3. The always-interesting subject of human emotions discussed in a readable way by a psychologist.

*Science News Letter*, August 31, 1935

## Genetics

**GENETICS**—H. S. Jennings—*Norton*, 373 p., \$4.00. A satisfyingly complete discussion of the subject by a veteran of American science, qualified to speak as one having authority, by virtue of his special knowledge of genetics, his wide general experience in biology generally, and his mastery of the difficult art of really careful thinking.

*Science News Letter*, August 31, 1935

## Botany

**PLANTS OF THE VICINITY OF NEW YORK**—H. A. Gleason—*New York Botanical Garden*, 198 p., \$1.65. Of the making of good regional books on botany there seems to be no end—a most gratifying state of affairs. The present volume, a round-cornered, well-bound little book that will easily slip into a man's coat pocket, "keys" the species in the most densely populated, most thoroughly hiked-over region in the United States. Its author is qualified both by long experience in his science and by long residence in his region.

*Science News Letter*, August 31, 1935

## Agriculture

**THE SOYA BEAN, ITS HISTORY, CULTIVATION (IN ENGLAND) AND USES**—Elizabeth Bowdidge—*Oxford University Press*, 83 p., 18 plates, \$2.00. Soy bean cultivation and use in the United States are going forward by leaps and bounds. This small book will therefore be welcomed by interested students who wish to make comparative studies.

*Science News Letter*, August 31, 1935

## Biology

**EXPOSÉS DE CHIMIE-PHYSIQUE—VOL. II.—LA SYNTHÈSE ASYMÉTRIQUE**—J. P. Mathieu—*Hermann et Cie., Paris*, 29 p., 8 fr.

*Science News Letter*, August 31, 1935

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# •First Glances at New Books

Additional Reviews  
On Page 143

## Botany

**SOME AMERICAN TREES**—William B. Werthner — *Macmillan*, 398 p., \$5. While this book is subtitled "an intimate study of native Ohio trees," it will be useful far outside the boundaries of that state. For Ohio is the meeting-place of trees from all over the cis-montane United States; which will make the present work of value all the way from Montana to Maine, from Texas to Florida. Beautifully clear halftone illustrations give point to a well-digested text.

*Science News Letter*, August 31, 1935

## Biology

**AN OUTLINE OF GENERAL BIOLOGY**—Gordon Alexander—*Barnes & Noble*, 181 p., 75c. No matter what textbook a student may be using, he ought to have one of these compact little guides on the corner of his table, too. It will aid him to keep track of the woods no matter how thick the trees are, and it will help no end on the eve of that inevitable *dies irae* when examinations come.

*Science News Letter*, August 31, 1935

## Fisheries

**THERMAL PROCESSES FOR CANNED MARINE PRODUCTS** — O. W. Lang — *Univ. of Calif.*, 182 p., \$2.00. A technical work, which will be a highly useful guidebook in the large and important canning industry of the Pacific coast, and will doubtless find its way to the reference shelves of canneries and food laboratories on the other shore of the continent as well.

*Science News Letter*, August 31, 1935

## Mathematics

**TEXTBOOK OF ALGEBRA**—William H. H. Cowles and James E. Thompson—*Van Nostrand*, 414 p., \$2.25. Textbook for a one-year course in college algebra which abandons the lengthy time-consuming review of the material offered in secondary schools. Such material is condensed into a single chapter. Emphasis is placed on the graphical part of the work as preparation for analytic geometry and for first year scientific and engineering work.

*Science News Letter*, August 31, 1935

## Archaeology

**INSCRIPTIONS FROM ALISHAR AND VICINITY**—Ignace J. Gelb—*Univ. of Chicago*, 84 p., 62 plates, \$6. A report on the clay documents excavated by Oriental Institute expeditions at Alishar Huyuk in 1927 to 1932. The inscriptions shed important light on history and culture of

Asia Minor in the twentieth century B.C. Dr. Gelb has presented them very completely for study, giving not only facsimiles of the text and translation, but transliteration, notes, and a text index.

*Science News Letter*, August 31, 1935

## Archaeology

**SUMMARY OF ARCHAEOLOGICAL WORK IN THE AMERICAS: 1931-1932-1933**—S. K. Lothrop, Frans Blom, Carl E. Guthe—*Pan American Union*, 77 p., 39 illus., 5c. Shows what is being accomplished in North and South America by archaeological research, even in three years of "hard times." The publication is Number Seven in the Pan American's "American Archaeology Series."

*Science News Letter*, August 31, 1935

## Archaeology

**AN INTRODUCTION TO NEBRASKA ARCHAEOLOGY**—William Duncan Strong—*Smithsonian Institution*, 323 p., 25 plates, \$1.50. The ancient story of the Plains region begins to have considerable depth and detail when an introduction as large as this can be produced. Archaeological digging in this part of the Indian world shows "a surprisingly ancient and complex sequence of cultures," which all the theorizing had failed to predict.

*Science News Letter*, August 31, 1935

## Microscopy

**ELEMENTARY MICROTÉCHNIQUE**—H. Alan Peacock—*Longmans Green*, 200 p., \$1.90. A guide for the beginner in microscopic work; gives directions for mechanical manipulations, briefly discusses stains, reagents and processes, and gives a series of clean-cut routines for the handling of a large variety of plant and animal materials.

*Science News Letter*, August 31, 1935

## Biology

**EXPOSÉS DE BIOLOGIE—VOL. I—LE BILAN MATÉRIEL ET L'ÉNERGÉTIQUE DES SYNTHÈSES BIOLOGIQUES**—Hiroshi Tamiya—*Hermann et Cie., Paris*, 42 p., 10 fr.

*Science News Letter*, August 31, 1935

## Mathematics

**LOGIQUE, MATHÉMATIQUES ET CONNAISSANCE DE LA RÉALITÉ**—Hans Hahn—*Hermann et Cie., Paris*, 51 p., 10 fr.

*Science News Letter*, August 31, 1935

## Anthropology

**PRIMITIVES AND THE SUPERNATURAL**—Lucien Lévy-Bruhl—*Dutton*, 405 p., \$5. A well-known anthropologist analyzes the primitive's way of thinking, which he finds very different from that of civilized man. More particularly, he has endeavored to show how various primitive people imagine the supernatural and how they behave with regard to the occult powers that they so earnestly fear.

*Science News Letter*, August 31, 1935

## Geology

**GEOLOGY OF NATURAL GAS**—Edited by Henry A. Ley—*Amer. Assoc. of Petroleum Geologists*, 1227 p., \$6.00. An almost encyclopedic volume on the geology of natural gas in North America. Consists of 38 papers prepared by 47 authors. Only two of the papers have previously been published. The geology of the most important gas deposits is described, together with the methods of estimating natural gas reserves and a resume of the industry.

*Science News Letter*, August 31, 1935

## Technology

**SYMPOSIUM ON PAINT AND PAINT MATERIALS**—Philadelphia Regional Meeting of the American Society for Testing Materials—*Amer. Soc. for Testing Materials*, 150 p., cloth, \$1.50, paper, \$1.25.

*Science News Letter*, August 31, 1935

## Chemistry

**THÉORIES CHIMIQUES — VOLS. VIII AND IX—LA CELLULOSE**—Martin Battegay — *Hermann et Cie., Paris*, Vol. VIII, 71 p., 18 fr.; Vol. IX, 60 p., 16 fr.

*Science News Letter*, August 31, 1935

## Animal Psychology

**EXPOSÉS DE PSYCHOLOGIE ANIMALE —VOL. I—HISTOIRE NATURELLE DE LA CONNAISSANCE CHEZ LE SINGE INFÉRIEUR**—Louis Verlainé—*Hermann et Cie., Paris*, 49 p., 12 fr.

*Science News Letter*, August 31, 1935

## Physics

**ATOMISTIQUE—GRAINS DE MATIÈRE ET DE LUMIÈRE**—Jean Perrin—*Hermann et Cie., Paris*, Vol. III 42 p., 12 fr.; Vol. IV, 50 p., 14 fr.; Vol. V, 23 p., 7 fr.; Vol. VI, 42 p., 12 fr.

*Science News Letter*, August 31, 1935

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